POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things" — Smithsonian Institution — Written so you can understand it

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Where the Real Southern Molasses is Made

Typical Syrup Factory of the South--One of the Familiar Scenes, Considered so Picturesque During the Civil War, that are Now Giving Way to Advanced Methods of Manufacture

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Say Shamrock III Must Win.
Powerful Ice Breaking Steamers, Part II.

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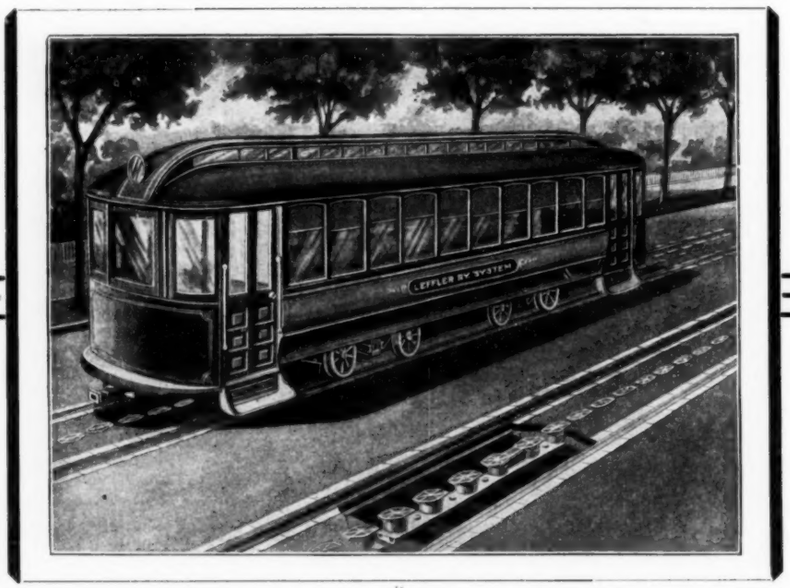
The 20th Century Method ...of Electric Traction...



THE LEFFLER ELECTRO-MAGNETIC RAILWAY COMPANY owns and controls the Leffler Patents for an Electro-Magnetic Railway System which will revolutionize modern methods of electric traction. This system does away entirely with the dangerous network of overhead wires and poles, also the unwholesome conduit, with its open slot between the rails. It is not affected by electric storms and all danger from electrolysis is entirely eliminated.

It affords a continuous and reliable power without danger to life or property and is not affected by slippery rails, snow or ice, as it is not dependent upon the adhesion of the wheels to the rails to stop or propel the cars. The car is drawn or pulled by electro magnets placed between the rails. The attraction of these magnets on the car being similar in principle to that by which a horseshoe magnet attracts a needle. The operator has constant and absolute control of the car and can come to an almost instant stop without the use of brakes and with no more jarring sensation than that of impact against a soft air cushion.

The Leffler System affords one-fourth greater speed with increased safety, and the consumption of fuel is but 50 per cent. of any other system

There are no burn-outs on cars or track and this, with the simplicity of motive power, brings the item of repairs to about one-fourth that of any other electric traction system. Much larger results are obtained with expenditure of less power and

The total saving of the Leffler System is conservatively estimated to be fully 25 per cent. of the gross running expenses of any other system.

More than $100,000 has been expended in perfecting this system by Mr. P. W. Leffler, and it now has the full endorsement of the most eminent and expert engineers such as Mr. John Ericson, City Engineer of Chicago, Mr. Karl L. Lehman, who has been associated with Mr. Ericson, Mr. F. W. Cappelen, for twelve years city electrical engineer for Minneapolis, Minn. Complete and detailed reports signed by these well known experts and showing the results of actual tests made will be mailed to any address upon request.

This system is now perfected and has been demonstrated to be a complete and practical success. Its reliability under all weather conditions and freedom from dangerous and unsightly wires, poles, etc., will unquestionably cause municipalities to pass ordinances requiring its installation to the exclusion of all other systems, and its economy alone is sufficient to induce traction companies to adopt it in building new lines or in improving service already established.

The Leffler System is Destined to Become the Universal Traction System and the Profits Which Will Accrue to Investors in the Stock of the Company Owning these Patents are Almost Incalculable and are by far greater than can be Obtained Through Any Other Industrial Enterprise Whose Stock is on the Market at Any Price To-Day.

For the purpose of building and equipping a short line of road of standard size, to demonstrate to the public in a practical way the advantages of the Leffler System, the company offers for sale a block of fully paid, non-assessable stock, of which the par value is $50, at the low figure of $15 per share. This company has passed all experimental stages, and this offer means that

You have an opportunity to buy stock at $15 per share, that probably will reach a higher price than was ever brought by Bell Telephone, Brush Electric Light or other stocks that made the original investors of small sums wealthy men in a few years. Traction companies stocks are now considered the very safest and most profitable form of investment, and this stock will far surpass the largest dividend paying traction stock ever offered at public or private sale. Electricians and people of mechanical education who can understand the revolution this system will accomplish can appreciate that this is an opportunity which only occurs once in a lifetime.

The above offer is made for the purpose designated and will be withdrawn immediately upon realization of sufficient funds to build and equip the proposed road.

Send for prospectus and experts' reports.

LEFFLER ELECTRO-MAGNETIC RAILWAY COMPANY,
FISHER BUILDING, CHICAGO.

Mention Popular Mechanics.

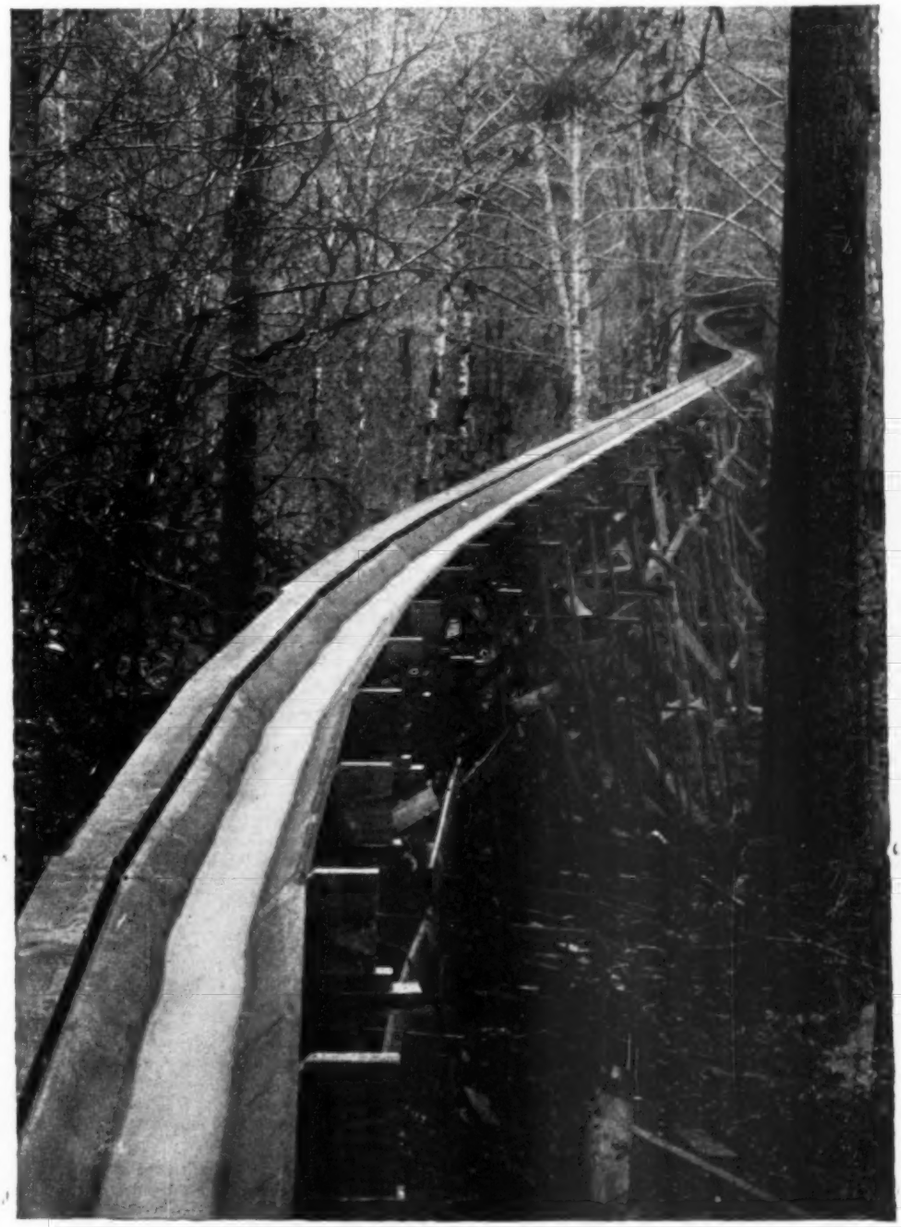
Mention Popular Mechanics.

Longest Lumber Flume in the World

How Timbers are Shot Down the Mountain Sides in the Big Tree District of California

A flume in the heart of the great redwood forests of California near Madera and 185 miles from San Francisco, is the largest in the world. It stretches through the woods for a distance of 53 miles, or, including its feeders, 71 miles. The flume is V shaped with 36-inch sides, and is 46 inches across the top. It is built of double 2-inch plank. It has a carrying capacity of 400,000 feet of lumber daily. The building of this great flume took 5,700,000 feet of lumber. The water for operating it is taken from the mountain streams which supply the Madera canal, and after it has served its purpose of transporting lumber it is turned into the canal at its lower end and used for irrigation.

The timber is carried through the flume at lightning speed. All that is required is a man at the top and bottom. If timber is coming in from the branches, a man is stationed at the junction to prevent jamming. In building the flume mountains had to be overcome, great gorges had to be bridged, deep forests penetrated and steep hillsides and precipitous cliffs blasted to make secure foundations for the heavy scaffolding that supports it. The total cost of building it was $275,000.



Lumber Flume 71 Miles Long in the Great Tree Forests of California

SEVENTEENTH CENTURY MITRAILLEUSE.

In an old diary he kept himself, Luttro speaks of preparations being made to invade Ireland. He mentions that there were to be taken with the English army 4-wheeled engines which discharged 150 musket bullets at once. This must have been nothing but the 17th century Mitrailleuse. They have, however, passed away utterly, we do not even know who was their inventor.

SARDINES OUGHT TO GET CHEAPER NOW.

Hitherto the most expensive thing about the cheap sardines has been the boxes, of which, by a machine formerly used, a man has been able to make about 10,000 a day. A smart Norwegien, Henrik Finne, of Stanger has invented a new machine for the purpose, by which a man can make 15,000 or 20,000 tins a day.

Magnesium is now largely employed in Germany as a deoxidizing agent in refining copper for electrical purposes, says the "Oestrerrichische Zeitschrift fur Berg und Huttenwesen."

WATERPOWER OF THE WORLD.

An estimate of the waterpower used for generating electricity recently made by a German engineer shows that Germany and Austria utilize 180,000 horsepower; Switzerland, about 160,000; Sweden, 200,000, and the United States, 400,000. The total available power in Sweden is placed at 2,000,000 horsepower; that of France at 10,000,000; that of Germany, Austria, Switzerland and Italy together at 10,000,000; while in the United States Niagara alone could furnish 10,000,000.

A bill has been introduced to make the president's salary $100,000 per year.

PENNSYLVANIA RAILROAD BIG BRIDGE.

The Pennsylvania railroad will build a new bridge across the East River at New York City to cost over $8,000,000. It will require three years to complete the work. The bridge with its approaches will be two miles long, the central span will be 840 feet in length, and the bridge will be 135 feet above the river. The structure will contain 61,000,000 pounds of steel.

Russia is to build a new railroad along the southern shore of the Crimea. The line is to be constructed so as to be brought into communication with the general railway system of the empire.

Manufacture of Table Syrups in the South

Untold Wealth Will Result From the Advanced Methods Now Supplanting the Old

By H. W. Wiley, Chief of the Bureau of Chemistry, U. S. Department of Agriculture.

Editor's Note:—The old style syrup mills, considered so picturesque during the civil war, are yet to be found in many parts of the South, but of late they are rapidly giving way to more improved and economical methods in keeping with the general commercial advancement of our country. The sugar industry in America is assuming enormous proportions and the old time syrup mills may soon be supplanted by great centrally located sugar factories for the manufacture of sugar, starch and syrup, all of which are produced from the various qualities of the sugar cane. By the development of these great industries untold wealth will in the near future roll into the South. It is because of the growing importance of the sugar and syrup industry as well as a desire of preserving a record of the quaint old methods of manufacture, now so rapidly passing away, that Popular Mechanics presents to its readers these interesting articles by Prof. Wiley.

Since the introduction of sugar cane in the United States over 100 years ago its cultivation for the purpose of manufacturing table syrups has been extended until it is now practiced over large areas of southern Texas, nearly the whole of the state of Louisiana, portions of southern Mississippi and Alabama, the southern part of Georgia and South Carolina, and over the whole extent of Florida. Nearly all of the methods which have been employed for this purpose have been of a crude nature and involve no accurate knowledge of the character of the cane employed, the amount of sugar which it contained, or the chemical composition of the product secured. So great has become the demand for this wholesome, palatable and nutritious article of diet that in the past few years manufacturing establishments have been erected on a much more elaborate scale and under much more rigid control than heretofore. The old-fashioned mule mill and iron kettle are giving way to the steam mill and steam evaporator. Improved methods of the treatment of the juice have been practiced, and attempts have been made to secure an article of standard quality and properties. Merchants desire to handle a uniform grade of syrup, so that when its value is once established they can meet the demands of their customers for this particular kind.

Lack of uniformity in its quality and the tendency of the syrup to ferment have restricted its markets to a rather limited area. An additional difficulty which these syrups find on the market is the fact that our grocery stores are stocked with artificial syrups; that is, those made of mixtures of various kinds in which glucose is one of the essential ingredients.

One of the most picturesque of the old style mills visited during our tour of the sugar cane districts in the interest of the department of agriculture was that of Capt. E. A. Vanlandingham, near Cairo, Ga. It was growing dark on our arrival, and thus an opportunity was afforded of seeing this quaint factory in its most attractive state; that is, when it was illuminated by a torch of "lightwood." This method of illumination is the one universally practiced in these old-fashioned establishments. The Vanlandingham mill is shown on the front page.

Some of the syrups of the finest flavor and most desirable quality are produced with a single open kettle for evaporation. When working on a large scale, however, more extensive apparatus and appliances are required. It is evident that in point of economy, the horse mill and open pan cannot compete successfully with the heavier mills, defecating pans, steam evaporators, pumps for lifting syrups and juices, cranes for loading and unloading cane, and other mechanical appliances to save labor and facilitate rapidity of work. The largest mill in the Cairo district and a type of the best modern construction is owned by a woman—Mrs. M. L. Wright. In most of the factories visited no attempt was made to chemically clarify the juices, but dependence was placed altogether on the action of heat and skimming. At the mill of Mrs. Wright, however, the juices were sulphured cold, as is practiced with the cane juices for sugar making in Louisiana, and subsequently lime was added nearly to neutrality, thus producing good clarification without darkening the color of the finished product.

The juices of many of the canes in certain sections where they were employed exclusively for the manufacture of syrup, were of a composition that would insure a fine yield of crystallized sugar. The great objection to the establishment of a sugar industry in the northern part of the cane district, however, is the comparatively short manufacturing season.

(To be continued.)

Factory of William Lomax, near Cairo, Ga., by H. W. Wiley, U. S. Department of Agriculture

WORLD'S CHAMPION BOOMERANG THROWER.

How an American Acquired the Art from Australian Teachers and then Excelled His Instructors.

While throwing the boomerang is supposed to be an accomplishment possessed solely by the Australian bushmen, it remained for an American to take up the art and become the champion boomerang thrower of the world. This American is S. J. Rawson, whose interesting article on how to make and throw a boomerang was published in a previous issue of Popular Mechanics. Mr. Rawson was born in America and has never been nearer Australia than San Francisco. He is now making a fortune by exhibiting his art on the stage. In the beginning of his performance he stands in the wings and throws the boomerang so it completely encircles the stage and comes back to his feet.

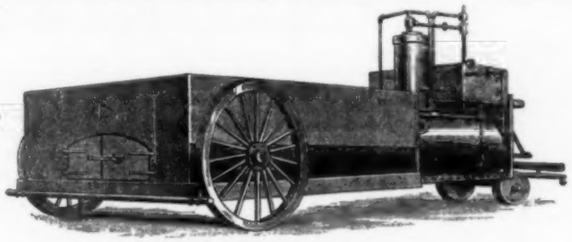
After performing this feat several times he changes his position and throws the boomerang so that it makes two complete circles of the stage. Then Miss June—who in private life is Mrs. Rawson—holds up a hoop. Mr. Rawson stands with his back toward her and throws the boomerang so that it circles around the stage and, returning toward the thrower, passes through the hoop. Another feat accomplished by Mr. Rawson is the throwing of four boomerangs so that all of them are in the air at the same time and all follow each other around and fall at his wife's feet. But what mostly interests the audience is when Mr. Rawson steps to the front of the stage and with all his might hurls a boomerang out into the audience. Intuitively every one ducks, but they need not do so for the boomerang sails gracefully over the heads of the audience, completely circles the theatre and falls back on the stage at his feet.

Mr. Rawson has been practicing boomerang throwing for 10 years, but has only been able to throw on the stage for about four years. This is his first season with the attraction in America, as he has been in England for the past four seasons. He now makes a specialty of short distance throwing. When he first began throwing he says his boomerang wouldn't turn in a five-acre lot. Sometimes they would only go 20 or 30 feet and stop and fall to the ground. At other times it seemed they wouldn't ever stop. Then again they would go out, mount the air and go whirling away, finally taking a notion to descend a hundred yards or more behind him. Mr. Rawson says he walked at least 25 miles the first day chasing after them. It proved so interesting to him, however, that he was out again the next day.

MACHINE FOR MELTING SNOW.

Unique Device Being Employed in New York for Cleansing the Streets.

In New York, they are now melting snow from the streets by machinery. The snow melter, a huge device for thoroughly cleansing the streets, has become a familiar sight in the metropolis. The melting is done rapidly and economically by means of a hot air blast which is brought into direct contact with the snow. The melter consists of a double-end



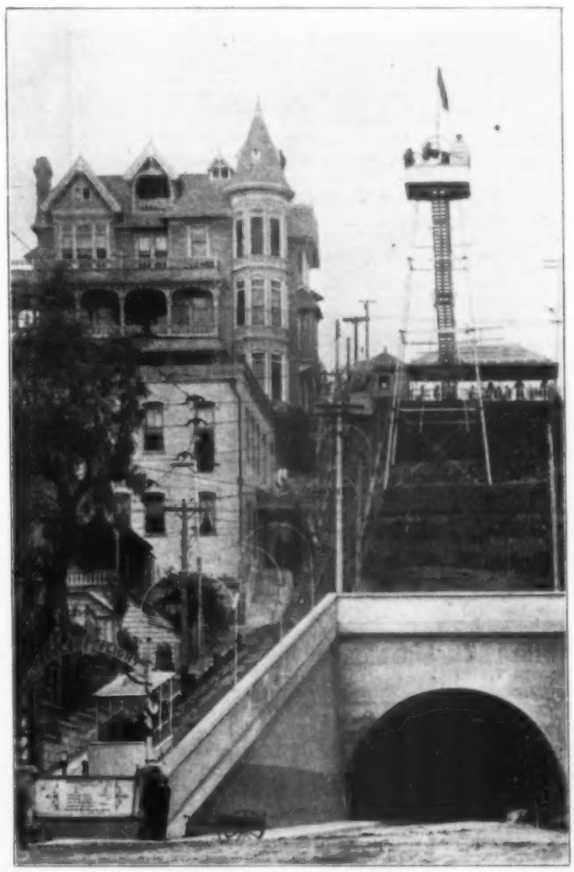
Snow Melting Machine of New York.

furnace with a large grate area surmounted by a horizontal water jacket and a crescent-shaped cross section with two inverted L shaped flues. The dimensions of the melter are the same as those of an ordinary truck. The melter is mounted on wheels and can be easily moved from place to place by a team of horses. The water jacket forms the bottom of an iron frame or box into which the snow may be shovelled direct from the street or into which a load of snow may be directly dumped. The furnace burns coke and is large enough to hold a cart load at a time. The snow is placed in direct contact with the heated flues and is melted as fast as a gang of laborers can shovel.

SHORTEST AND STEEPEST RAILROAD.

"Angel's Flight" of Los Angeles Carries People Heavenward in a Unique Manner.

The shortest and one of the steepest railroads in the world has just been put into operation in Los Angeles, Cal. It is only 319 feet long, and in that distance makes an ascent of half as many feet. In its little white cars more rides may be had for a dollar than in any other cars that ever ran, yet if



"Angel's Flight," Los Angeles, Cal.

ordinary railways were as profitable in proportion to length as this picturesque affair, they would yield astonishing dividends.

This unique carrier of passengers is appropriately named "Angels' Flight" and affords means of transportation between the lower and level part of the city and the lofty hill portion, a large and beautiful residence section known as "Olive Heights." Formerly that eminence could be reached only by a long detour or by climbing half a dozen flights of exceedingly difficult stairs. Among the many who trudged up and jolted down these steps was Col. J. W. Eddy, and he conceived the idea that a railway up the incline could be made to pay, though railroading in so small a scale had never been attempted before.

Failing to interest anybody else, Col. Eddy undertook the road's construction himself. While the financiers laughed at him and the public ridiculed his project he pushed the work, making large expenditures, and soon had it completed. The enterprise proved a marked success from a financial as well as mechanical standpoint and is now the property of a distinct corporation, the Los Angeles Electric Incline Railway Company, with Col. Eddy as superintendent. The people who scouted it are now patrons of the line.

Popular Mechanics want ads are the best value for the money to be found in the United States.

An automobile postal service with electrical vehicles is to be inaugurated at Milan, Italy.

Popular Mechanics

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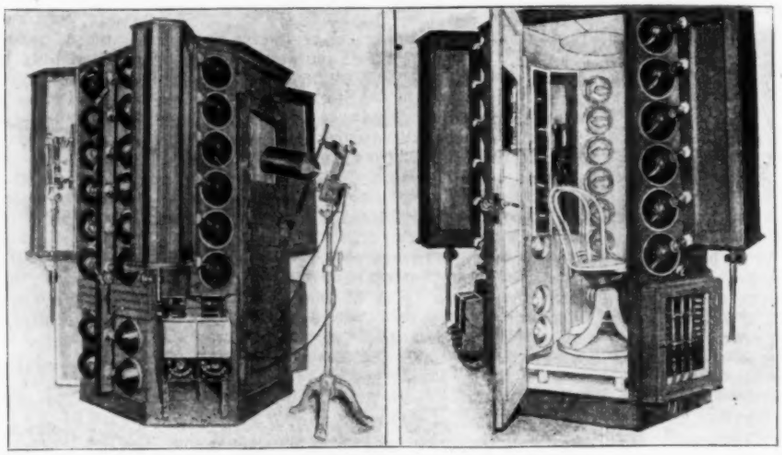
This Issue 24,500 Copies

ELECTRIC LIGHT BATH MACHINE.

The electric bath is one of the latest additions to an eastern hospital, and scores of powerful electric lights, both arc and incandescent, unite to pour warmth and chemical rays into the body of the patient. For certain diseases the electric light treatment does what no amount of medicine could possibly accomplish. The person to be treated disrobes, enters the cabinet, takes a seat on the chair and the door is closed. But he is not in the dark, on the contrary, intense lights pour in upon him from every side. By the use of different glass slides any colored light can be produced, it having been found that certain colored rays have special effects. The eyes of the patient are shaded to prevent blindness. Any of the myriads of lights can be directed in any direction, or many of them may be centered upon some special spot. While the lights are doing their work other electric lamps have heated the cabinet to any temperature desired. A mid-summer's day out in a desert is not a circumstance to the electric cabinet. Air is let in through small holes which can be entirely closed. The electric current is controlled by a switchboard.

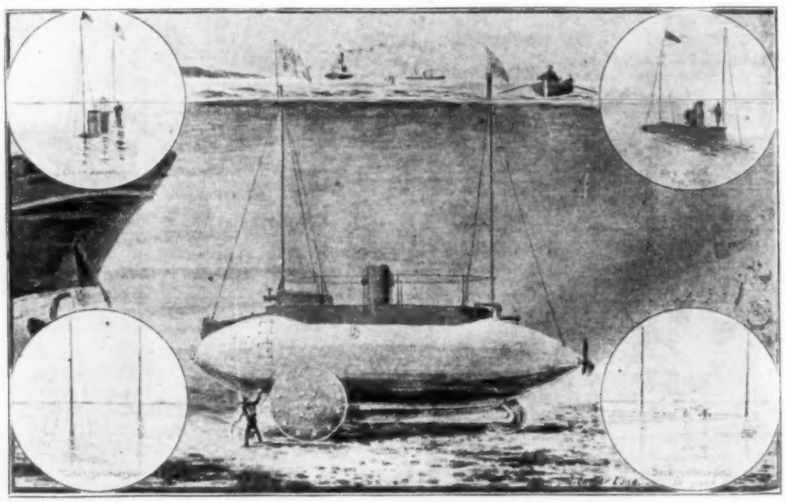


Electric Bath Cabinet—From the Journal of Advanced Therapeutics.

Submarine Automobile a Great Invention

Rolls on Wheels Along the Bottom of the Ocean and Raises Tons of Valuable Coal

Shoveling coal at the bottom of the ocean into a submarine automobile that rolls along the floor of the deep on wheels is a new and novel enterprise born of American genius and the present high price of coal. This submarine coal hauling vessel also marks the entry of the submarine boat into commerce where it promises greater success than as a device of war for which it was heretofore considered to be exclusively adapted.



Submarine Automobile in Operation.

Every year numerous coal lighters are sunk in the severe storms that sweep Long Island sound and hence the question of how to get the precious article to the surface arose in the inventor's mind. The Argonaut, the invention of Simon Lake of New York, was the result. Already it has cruised all around in the bottom of the bay and brought up many tons of excellent coal which is sold at good profit by the promoters of the project. Contrary to the expectations of many the coal was found to have not deteriorated a particle from the long soaking it had received, but made an excellent fuel. Since then it has been learned that sea water is a better preservative of coal than the air and even now the English government is experimenting with a plan to submerge coal to be used in the navy instead of keeping it exposed to air at the coal stations.

In speaking of the Argonaut the Shipping World says: Mr. Lake claims that the Argonaut is the only entirely successful submarine boat ever built, and also the only practical one. Mr. Lake designed her chiefly to demonstrate the utility of vessels of her type for practical commercial uses, and he has himself pointed out some of the fields in which the Argonaut is likely to prove useful. These include: Wrecking sunken vessels, salvage work, raising wrecks, and generally in all submarine operations where divers, diving-bells, and similar appliances are used. In the coral, pearl, or sponge fisheries; dredging gold and other metals and minerals from river and sea-coast bottoms; in laying submarine foundations, piers, docks, breakwaters, lighthouses, or removing rocks or debris from the entrance to harbors; as a scientific and pleasure craft.

MAGIC LANTERNS FOR HYMN BOOKS.

Many churches are now using stereopticons to illustrate religious subjects; and Biblical places for evening services. verses of hymns may also be thrown upon the screen and the American Amateur Photographer tells how these slides can easily be made. The writer says: Lanternists may be interested in an easy way by which I have made some fine slides of hymns, etc., which the audience may be asked to join in singing to break the monotony of the usual lantern lecture.

I cleaned some spoiled rollable film and placed it in my typewriter backed by a piece of stiff paper on which was outlined the size within which the writing should be kept, and, with black ink on the pad, the writing was sufficiently opaque to show well on the screen. The film was cut to size and mounted between two glasses in the ordinary way, the whole operation occupying only a few minutes.

Forgotten Inventors Who Made History

A Single Invention Saved the North from Being Conquered by the South--Battle of the Monitor and the Merrimac a Meeting of the Product of Two Inventive Brains

Inventors may change the course of a nation and yet be forgotten and spend their declining years in comparative poverty. But for a single invention the South might now be master of the Union and the North mourning a lost cause. But for Theodore R. Timby—few remember him now—history would not be written as it is. The names of great generals who made historical records by the spilling of much blood and the draining of the nation's wealth adorn the pages of our history and they are glorified by all succeeding generations. The name of a mere inventor whose single invention costs the nation nothing, but prevents its overthrow, is forgotten. History does not record his name and the nation he saved lives on in wealth without ever stopping to thank him.

It was the revolving turret that made the Monitor capable of defeating the Merrimac. Without the revolving turret the Monitor would have been more helpless than the numerous other vessels the grim Merrimac had sunk in its victorious and devastating cruise. Theodore R. Timby—then but 19 years old—invented the revolving turret. At the time great men and newspapers lauded the invention, but the temporary praise was all Timby ever realized from his masterly conception.

A Southern mechanical genius, whose name is quiet forgotten, conceived the possibility of covering the sides and ends of the Merrimac with railroad iron, and thus converting her into a formidable ironclad. The Merrimac was originally a Northern vessel—a first-class 40-gun steam frigate—which, by Captain McCauley's orders, had been scuttled, partly sunk and abandoned. It was raised by the Southerns and through the suggestion of this now unknown mechanic was transformed into a crude but formidable war vessel. It gave to the confederates undisputed command of every wooden vessel then afloat. As soon as it rode out upon the waters it struck terror to the heart of the enemy.

On March 9, 1862, P. H. Watson, assistant secretary of war, reported: "The Merrimac, an armor-clad vessel, issued from Norfolk yesterday, captured several of the United States blockading vessels and threatens to sweep our whole flotilla from Chesapeake bay. Under these circumstances it is necessary to capture and destroy the Merrimac and the whole wealth and power of the United States will be at command for that purpose."

The Merrimac's plans were to sink and destroy the Yankee fleet, steam up the Potomac, set fire to Washington, and finally to lay every city on the sea coast under contribution. Terror reigned throughout the North. President Lincoln assembled his cabinet and during the meeting Secretary Stanton said:

"I have no doubt that the enemy is this moment on his way to Washington, and it is not at all unlikely that we shall have a shell or cannon ball from her guns before we leave this room."

But the Merrimac was employing her time well enough destroying and sinking Northern ships. On March 8 she approached very near the Congress, but passed on to the Cumberland, rammed and sunk her, and 121 officers and men were killed. Then she returned to the Congress and set her on fire. The fire reached the magazine, when the ship was blown to atoms, killing 120 men. On went the Merrimac, leaving a trail of death and desolation in her path. The Roanoke was disabled, the Minnesota stranded, and there was not a ship left that dare face the Southern ironclad.

But a 19-year-old inventor had worked hard and perfected his revolving turret. It had been installed on the Monitor. The Monitor went out and met the Merrimac.

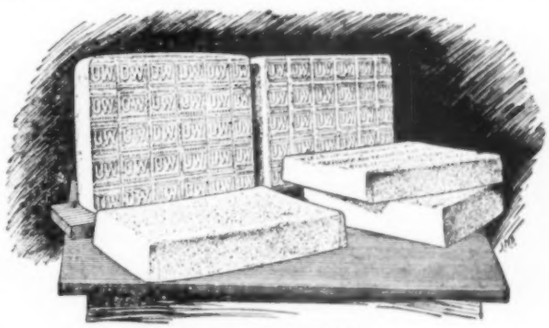
You know the rest. But you do not know about Timby, who invented the Montior. Neither does the writer. All he knows is that Timby was born in Duchess county, New York; that he saved Lincoln and the whole United States government from being overthrown; that Timby made it possible for the millionaires of our nation to live in peace and accumulate their world-famed fortunes; but where is Timby now? I don't know. It is probable that you don't know. Yet he must be living, for certainly the newspapers will record his death when he dies.

Thus Southern inventive genius made it possible for the South to put forth the terrible Merrimac on its crusade of destruction, and a Northern inventive genius made it possible to destroy the Merrimac. The men who commanded the ships, who used the inventions, are famous. The men who invented them are forgotten. And although the war office declared:

"It is necessary to capture and destroy the Merrimac; and the whole wealth and power of the United States will be at command for that purpose," Timby yet lives by what means he earns from his inventions, just as other inventors do. He saved a nation. He made it possible for others to gain fame and wealth. That is Timby's reward.

MAKING CHEESE IN BRICKS

The old-fashioned butter jar of our boyhood days has generally given place to the "bricks" sent out by machine-made



Wisconsin Cheese Bricks.

butter factories, and now it is proposed to make cheese in pound bricks also. At the University of Wisconsin experiments were deemed successful, the cheese being made in sheets marked off into small bricks each weighing about one pound.

TROLLEY CAR SMASHES A BRIDGE

An unusual accident occurred on a trolley road near Lee, Mass., resulting from the car jumping the track as it was about to cross a steel bridge. The car was running at 45 miles an hour and the force of the blow completely wrecked the steel structure, as shown in the engraving. The Street Railway Journal says there were no passengers on the car

Car Plunging Through Bridge Superstructure.

and both conductor and motorman escaped without serious injury. It was necessary to build an entirely new bridge and the car was burned to get it out of the way.

Compressed Air says that owners and operators of air compressors do not as a rule give sufficient attention to the question of lubrication.

Easy Electrical Experiments

By L. P. Dickinson

HOW TO MAKE AN ELECTRIC ENGINE.

The present chapter deals with the construction of a small electrical engine, which, while it is a toy, will be a source of amusement to the mechanically inclined youth. All the difficult parts of the machine may be obtained by dismantling an old brass clock. A wealth of material is available from such a source in the form of wheels, pinions, shafts and strips of brass and of steel.

A side view of the engine is given in Fig. 1, and a plan view is given in Fig. 2. At the left in Fig. 1, is shown an electromagnet. This is made from a round piece of iron rod, ½ inch in diameter, bent into the shape of the letter

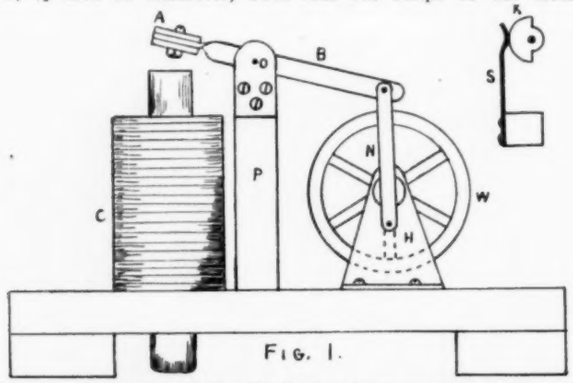


Fig. 1.

U, each of the arms being 3½ inches long, measured from the extreme bottom. On each arm wind a coil of insulated wire, so as to form a bobbin 2 inches long and 1¼ inches in diameter. These had better be made of number 24 double cotton covered magnet wire of which about 4 ounces will be required. Carefully insulate the iron core by a layer of paper, before winding the wire, and provide also circular wooden ends for the coil, which fit tightly upon the iron core, and hold the wire in place. The end of core should project ½ inch beyond end of coil.

Make a base board by taking a piece of smooth pine, or whitewood, ½ inch thick, 6½ inches long and 3⅝ inches wide. Across each end screw two strips to keep the base from warping. Mount the magnet so that its center is 1⅞ inches from the left hand end of the base, securing it in

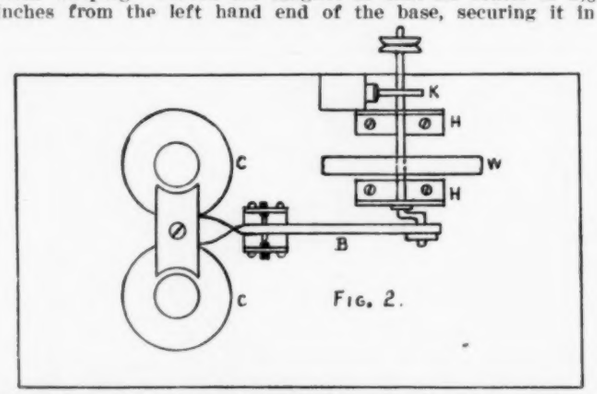


Fig. 2.

place by a block screwed to the base, the lower part of the iron core being fitted into a slot cut in the base.

At a distance of 2⅞ inches from the same end of the board, and in the center, mount very firmly a post, 2½ inches high and ½ inch square. This is shown at P.

Having procured an old clock, cut with a file, two strips of brass, these strips being cut from those portions of the frame which hold the little steel bearings upon which the balance wheel rests. These strips should be one inch long, and cut so that the bearing is ¼ inch from one end. Screw these strips to the opposite sides of the square post, so that the bearings are exactly 2⅝ inches above the base board, and exactly in line.

The beam shown at B is 3 inches long, and ¼ inch wide. At one end, the strip is twisted around at right angles, by clamping securely in a vise, and twisting it with a wrench, placed at a distance of ½ inch from the end.

At a distance of 1¼ inches from this end, is to be fixed a pivot which is to fit exactly into the two bearings in the top of post P. Possibly a strip of brass may be cut out from the frame of the clock, which will have a hole in it at just the right place. Drive the balance wheel off from its shaft, and drive the latter tightly into place in the hole B, and adjust by filing, until the beam may be mounted in its bearings and swing very freely up and down.

At the twisted end is to be mounted strips of soft iron shown at A, cut so as to fit as closely as possible into the space between the two limbs of the magnet, when the beam moves up and down.

At the right hand end of the beam is to be pivoted an arm N, which is to take hold of the crank upon the shaft of motor. This arm is 1¾ inches long and should move very freely. The pivot which holds it should be very freely fastened to B, soldering it if necessary.

The wheel W may be made by taking one of the larger wheels of the clock, and casting a lead rim around it. Because of lack of space the amateur will be left to his own devices to accomplish this.

The shaft upon which the wheel is mounted turns in two upright pieces of brass shown at H. The center of shaft should be 1⅛ inches above the base, and is at a distance of 4 7-16 inches from the left hand end of the base. The crank has a throw of ¾ inch.

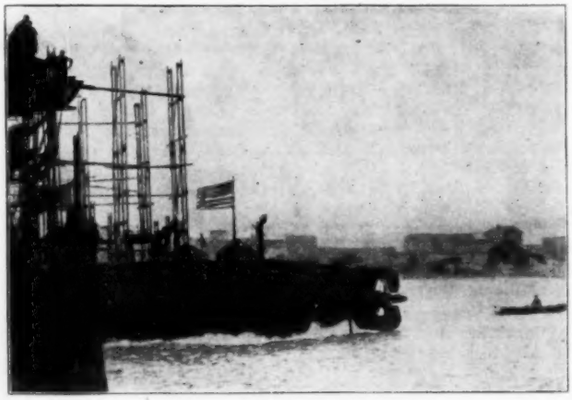
At the back side of the shaft is mounted firmly a piece of of brass cut in the shape shown at K. This piece has bearing upon it a spring S, so adjusted that the electric circuit through the coils is closed while the armature A is moving downward, but opens the circuit as soon as the armature reaches its lowest point and begins to move upward. Thus the magnets are excited, and pull on the armature while it is moving downward, but cease to pull while it moves upward. Some adjustment of the contact strip K may be necessary at first, but it may then be soldered permanently in place. Three cells of gravity battery ought to run the motor at a good rate of speed.

DESTROYERS OF DESTROYERS.

Two Dangerous Little Submarine Boats Added to Our Navy.

Destroyers of destroyers are the "Pike" and "Grampus," two formidable submarine boats that have recently dived into the ocean from the Pacific Coast. These are cunning, crafty crafts that move about under the water so artfully and noiselessly that no enemy's battleship could be considered safe when they are around. They could slip up to the monster men of war, plant torpedoes on their bottoms, escape and rise to the surface again in time to see the great ships blown to atoms.

Both the submarine torpedo boath destroyers were built by



Submarine Torpedo Boat Destroyer "Pike."

the Union Iron Works Co., of San Francisco, at a cost of $170,000 each. They each have 120 tons displacement and are built for a speed of 8 knots an hour. The picture shows the Pike as she was taking her initial plunge into the waters from the ways a few days ago. Both vessels for the present will be stationed at the Mare Island Naval station, but will be ready in an hour's notice to dive down in the sea and go after the enemy fleet should occasion arise.

WORKS LIKE A REAL RAILROAD.

Locomotive Eight Inches High Hauls Little Freight Trains and Obeys Signals.

A complete railroad consisting of 461 feet of track with Atlantic type engines 8 inches high hauling freight trains, stopping at stations, noting signals, and making switches, is a novelty that is attracting big crowds daily to an exhibition

Miniature Railway System to Show Operation of Signals.

given by the Union Switch & Signal Co., at Swissvale, Pa., Semaphores, lights, electric bells and every other kind of signal ever used in train service are working on this miniature railroad. Their constant never failing operation, as the tiny trains speed along over the complicated little railroad, is a sight that would amuse the most morose. The exhibit was arranged by the company to exemplify its signaling and interlocking apparatus. The Railway Review says:

"The signals of the various designs are full size, mounted upon poles somewhat shorter than are used in real practice. The installation includes both mechanical and electro-pneumatic interlocking, with all the machines and other appliances complete, automatic electric block signals, and the staff system. The exhibit also includes an interesting collection of colored glasses for use in switch and signal lights.

Russia is planning a canal from St. Petersburg and the Baltic to the Black Sea, which will be 30 feet deep and will accommodate the largest of the ocean steamers.

Rev. L. G. Jordan, a colored clergyman of Philadelphia, has, as a means of settling the servant problem, established a school for colored servants in the Quaker City.

The chief rivers of Russia are connected by canals and it is possible to go from St. Petersburg to the Caspian sea by boat.

MUMMY'S DAUGHTER SUES FOR FATHER.

Finds that Instead of Resting in His Grave He Has Turned to Stone and is Touring the Country as a Curiosity.

John Allen, whose embalmed body has been viewed by many curious people in an undertaking establishment in an Iowa city, has been made the basis of a $10,000 damage suit. Eleanor Langford, daughter of the mummy, and her husband, Homer Langford, to whom she was recently wed, are the plaintiffs. Among the sued ones are W. C. Harbach, a prominent undertaker of Des Moines and W. E. Petis, who has invented an embalming fluid. It is this embalming fluid, it is claimed, that caused Allen's body to turn to a hard substance resembling rock. The plaintiffs thought the said Allen was reposing peacefully in his grave, they claim, when they were horrified to learn that in a rock-like condition he had been going around the country as an object of curiosity. They claim that at divers times and places the body was exhibited within and without the state, the defendants trafficking unlawfully in said body for many months, realizing therefrom vast sums of money. The daughter of the mummy includes, among her claims for damages, mental anguish, and loss of sleep, brooding over the ill fate of her father. Other items enumerated in her lists of damages are: actual cash value of the body $10,000; clothing, $50; shroud, $10; casket, $50. The defendants admit that they injected about a quart of newly invented embalming fluid into the veins of the dead man, but deny that there is any grave robbery in connection with the case. Immediately after the fluid injection, they claim, the body became as rigid as iron and as firm as rock. They say that the Iowa Medical college, which had obtained permission to dissect the remains, was unable to use the body because of its ossified state and it reverted to the undertaker.

HEARS THROUGH A RUBBER EAR.

Extraordinary Surgical Operation Performed in England.

An Englishman who had lost his ear recently had it replaced with a rubber ear through which he could hear as well as with the aid of the one he had lost. The operation is regarded as a masterly achievement in surgery and is being widely commented upon.

Dental Hints says: The external ear was successfully replaced by an artificial substitute made of vulcanized Vela rubber. The appliance was made by D. R. Cameron, L. D. S.

The British Medical Journal states: A plaster cast was first made of the left or normal ear, and also of the remains of the right auricle. An artificial right ear was then molded in wax, conforming to the left as far as possible and finally of vulcanized Vela rubber.

The Odonoblast says: "The artificial auricle is kept in position mainly by a process which fits into the external meatus. It is perforated for the admission of air.

TO MAKE ARTIFICIAL MARBLE.

A successful way of preparing artificial marble is to thoroughly mix magnesite, magnesium, chloride, flint, or its equivalent together with water, and pour the mass on to polished glass or other material from which it is removed when hard. The veins of marble may be imitated either by tracing or sprinkling with a paint brush or by means of pigments incorporated with the materials. The marble is applicable for wash stand tops, table slabs, window sills, etc.

MIRACLES OF LAUNDRYING.

In a recent exhibition of laundry machinery in London a machine was shown that will wash shirts at the rate of 200 an hour and starch one a minute at the same time. Another finishes collars and cuffs at the rate of 1,000 an hour. A third marks linen at one-sixth the ordinary time. It is said that a large laundry with an expense of over $150,000 a year can save $20,000 by the adoption of these miracles of steel and steam.

WHALE STRANDED ON SANDS.

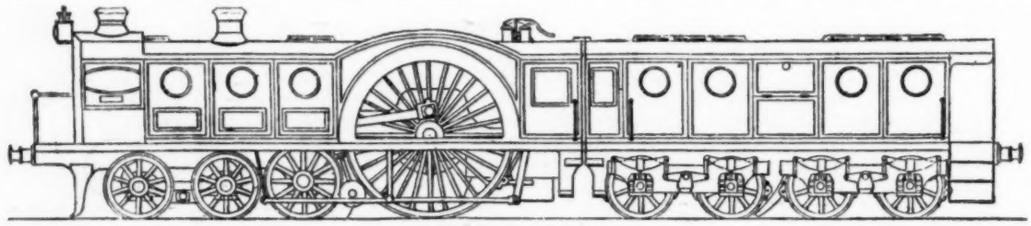
Blown Ashore on Pacific Coast During a Storm.

If he hasn't yet succeeded in making his way to sea or been slain by fishermen in the vicinity, a great whale now lies stranded at the mouth of the Columbia river jetty. At last reports, the indications were that the monster would never again reach the briny deep. The whale is about 75 feet long. During the height of the recent great storm that swept the Pacific coast the big fish was dashed against the jetty with great force. He struggled away for a moment but the waves that rolled mountain high threw him back against the sharp jutting rocks. Eventually he succeeded in slipping through an 18-foot bent in the jetty and headed for the sea. Beyond the jetty the water is shoal for a considerable distance and the fish found much trouble in making his way seaward. He got out a few hundred yards and was stranded again. At last reports he was still pounding away on the sands.

ENGINEER'S CAB IN FRONT OF ENGINE.

Novel Locomotive Patented by an Englishman for Use in That Country.

A locomotive with the engineer's cab at the smoke-stack end with auxiliary coupling gear was patented in England in 1895 by Michael Reynolds of Standeford The accompanying illustration shows the novel locomotive. The boiler, engine



Curious Locomotive

and coal bunker, water tank and appendages are mounted upon three bogie cariages and two independent axles. Running from end to end of the complete locomotive is an outer casing in the form of a corridor, divided into three compartments. The front compartment is for the accommodation of the engineer and the engine cleaner, who travels with the locomotive. The fireman's room is to the rear. This compartment extends in front of the smokebox of the boiler and the engineer has thus a clear view of the line through the lookout glasses or windows.

The Engineer of London says: "The regulator, reversing gear, continuous brake, hand brake and other parts or motions are all controlled from the drivers (engineer's) compartment. As this compartment is separated by a partition and doors from the engine room, and is also separate from the fire room, the driver is enabled to keep a good lookout and is not subjected to the heat or blaze from the firebox during the stoking. Adjacent to the driver's compartment is the engine room. The stoking compartment is at the rear of the engine room, between the boiler and the coal bunker and water tank.

The windmills of Holland are on wane. All now standing are old and no new ones are being built. The gas engine and the steam engine have taken their places and we may yet have a Holland without windmills.

Eating oysters dredged from near sewer outlets in Long Island Sound is ascribed as being responsible for a typhoid epidemic in New Rochelle and other New York suburbs.

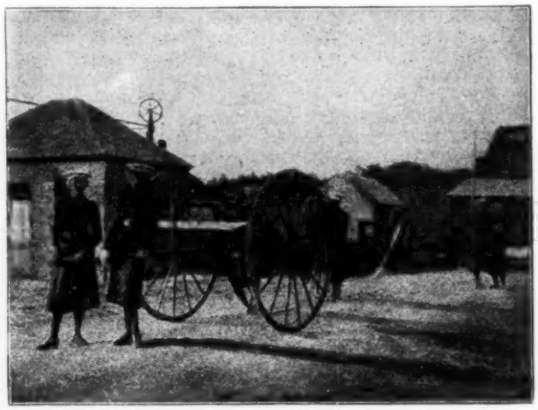
Yes, the world owes you a living, but you must do your own collecting.

WOMAN FIRE BRIGADE.

Athletic Young Girls Trained to Save Property and Life in New South Wales.

The town of Armidale, New South Wales, has a woman's fire brigade that has earned distinction in numerous encounters with flames. The brigade is well organized and every member is trained to her duty. The firewomen take a pride in their occupation and for daring cannot be excelled. They are mostly young girls, althletic and trained to climb and run. In sprinting contests they have defeated the swiftest footed men. Fire and Water of London says:

"A dozen or more young ladies form the brigade, electing



Women Firemen of Armidale, New South Wales.

one of their number as captain. They drill with the town brigade's appliances, and are capable of rendering assistance to the male firemen when necessary. They are expert in rescue work with the life-line, "Curricle" escape, and jumping sheet, as also the handling of the hose."

ELECTRICITY TO MAKE DEAF MUTES TALK.

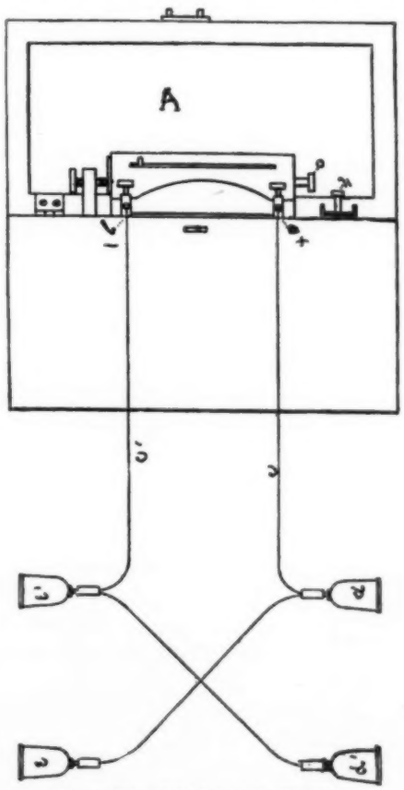
Darkness or Blindness No Hindrance in New Method that May Supplant Systems of Talking With Hands.

Electricity that has furnished so many conveniences to mankind in general has at last come to the aid of the deaf mutes, enabling them to converse with each other more conveniently and intelligently than ever before, and to make darkness no hindrance in carrying on their silent conversation. No matter if the person be deaf and dumb and blind he can now talk and he will not have to do so by the aid of raised letters. A simple electric battery, properly equipped, furnishes the means by which these things are accomplished, and promises to do away with the ancient and cumbersome method of talking with the hands and lips and also the raised letter method for blind mutes.

Attached to wires extending from the battery are thimbles, which fit over the thumb and forefinger of the mutes in conversation. When one person touches the thimbles on his thumb and forefinger together it conveys an impulse to the other person wearing the thimbles, and, through the repeated touching together of the thimbles by a code, the conversation is carried on. The device is the invention of Jacob Reese of Sharonhill, Pa.

The mechanism of the apparatus is shown in the accompanying illustration. A binding post for attaching the positive wire is indicated at (a); and a post for attaching the negative wire at (b). Bifurcated wire conductors (c) and (c') are attached at their upper ends to the posts (a) and (b). The metallic finger thimbles which form contact members are attached to the free end of these conductors and their bifurcated points.

The key of the battery is at (n). One of the conversationalists incases the thumb in (d) and the forefinger in

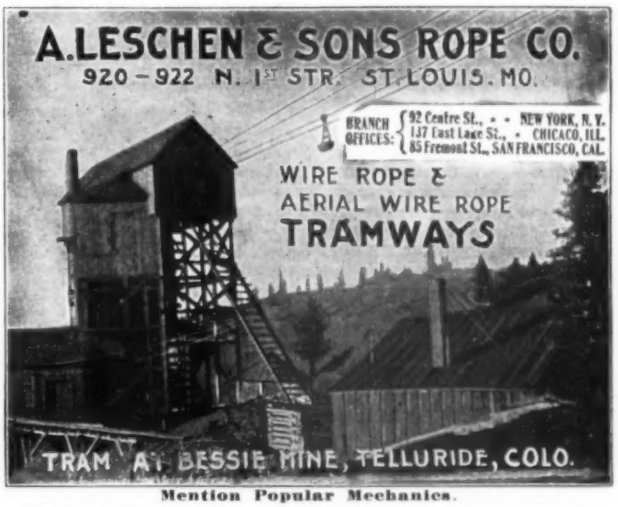


Transmitting Intelligence by Electricity.

(d') of one set of conductors and another person encases the thumb in (e) and the forefinger in (e') of the other set. Now when the key is closed each of the thimbles becomes electrified and the impulse is felt by both persons, but if the thimbles (e) and (e') are now touched the current is short-circuited and neither party feels the impulse. If (e) and (e') are left open and thimbles (d) and (d') are made to touch the current is short-circuited and there is no impulse to either party. Thus the impulses may be sent from one to the other instantaneously by opening and touching the thumb and forefinger. The inventor says:

By using the Morse code two persons within this circuit can converse together as rapidly, as distinctly and as accurately as a person can now telegraph a message. There need be no mistakes, as both persons feel the same impulses. The strength of the impulses may be made lighter or stronger by adjusting the regulator (o). When the current is not required it should be shut off by opening the key (n).

By the use of my improved method persons may carry pocket batteries and converse with each other while walking on the street or while on the cars or other mode of transit. They can talk in the dark as well as in the light, and where the house is properly wired persons in different rooms or in different beds may commune together. The blind mutes can throw their cumbrous fingerboards away and receive and send their impulses by electricity with as great rapidity as can be done by telegraphing to-day. The school houses can be wired so that the teacher can speak to anyone or to every scholar in the class room at the same time and can call any one or class to the office at any time. The great advantage of the bifurcated wires is that they bring both parties in when the circuit is open and throw them both out when either side is shunted. When two parties hold the thimbles, a third party may send a message to them by using key (n); but he could only receive the answer through the thimbles. The thimbles are such as ordinarily used by women in sewing. They have an opening in the end so as to receive the wire, which may be easily separated, so as to attach a thimble of the desired size.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SHORES STREWN WITH DEAD FISH.

Disastrous Conditions Result From Powder Mill Explosion.

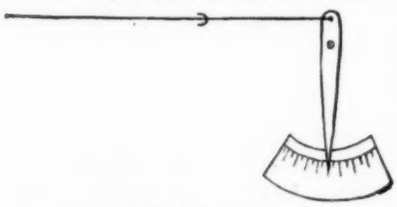
Fish piled up on the beach two feet thick and still being hurled to shore with every incoming wave; fish covering the waters far out at sea; dead fish and dying fish; fish in countless millions, and no way to stop their coming, no way to utilize them. Such are the remarkable conditions confronting the inhabitants of Nanimo, British Columbia. The cause of all the trouble, that now threatens the city's health, was the recent explosion of the Hamilton Powder Co.'s Northfield works. It sent chimneys tumbling and shattered windows at Nanaimo; brought death in its train to Northfield; spread devastation throughout the town and had its dire effect upon the waters adjacent. The thousands of dead fish caused by the explosion seem to have created a pestilence in the water and the fish continue to die and are washed to shore in enormous quantities. Two miles of coast line from the colliery city is piled with herring to a depth of two feet. Had some one in that vicinity adequate facilities to convert fish refuse into fertilizer the owner could make a fortune without an effort in procuring the raw material. The inhabitants are now burning the fish as a means of protecting the public health, but even with this method they are making slow headway.

Many people say Popular Mechanics is the most interesting paper published.

SHOP NOTES

UNIQUE THERMOMETER.

Editor Popular Mechanics: Here is a drawing of a thermometer which I have put up in my school house. It is based upon the simple law of expansion of solids. It is a piece of largest size steel telephone wire, about six feet long. The small amount of enlongation, which is



Sexton's Thermometer.

according to the temperature of the air around it, is increased on a scale by means of a lever as a pointer, with a large difference in arm lengths. As this is the first one I ever heard of, I thought I would tell you about it.

Grover Sexton, Iola, Wis.

MAKES PERFECT THE GASOLINE LAMP.

An air-pressure gauge that will indicate exactly the amount of air pressure in an air-pressure gasoline lamp or a hydrocarbon lamp has been installed in the lamps recently placed on the market by the American Lighting Company, 112 Michigan street, Chicago. This unique device removes the one serious objection to these kind of lamps and makes them now among the most desirable lights in the world for nearly every purpose. The former lack of knowledge on the part of

Indicates Air Pressure in Gasoline Lamp

the user as to the amount of air pressure in the reservoir of the lamp has occasioned great difficulty in its operation and oftimes has been the cause of considerable danger. The invention means a great victory for this style of lamp and presages a popularity and general usage that few heretofore have thought it would ever attain. The lamps of the American Lighting Company are the only ones in existeuce equipped with the new invention.

E. G. Acheson, of carborundum fame, has taken out a patent for a process of making artificial graphite.

HIGH PRESSURE AND HIGH TEMPERATURE.

[Abstracted from an address before the Engine Builders' Association.]

While in the march of progress we have been gradually raising steam pressures, we have kept pace with the corresponding increase of temperature by improvements in construction until we have already moved the barriers and paved the way for the introduction of super-heated steam.

While it is difficult to form an exact estimate, there have probably been as many as 7,000, and possibly more, superheaters successfully installed by European manufacturers during the past ten or fifteen years, and the fact that the number of installations is rapidly increasing is the best proof that they are on the right track.

For a wide range beyond the temperature and corresponding pressure at which it is formed, steam possesses all the properties of a perfect gas, and therein lies one of its chief values as a vehicle for carrying heat into an engine to be transformed into power. Steam is so generally used in an engine because of its high latent heat, which allows the loss of a considerable amount of heat before condensation begins. But without superheating we stop at the threshold, whereas we might easily continue on to a place of safety, and instead of passing the steam through the engine on the ragged edge of condensation, it is easily within our reach to fix the gas permanently by raising it in temperature and adding enough heat units to supply the demands, both useful and wasteful, while it is passing through the engine.

Much of the indifference to super-heated steam has been due to the unreliability of the super heater, which has not always been of proper design; but at the present time there is no difficulty in obtaining a suitable and efficient apparatus at a reasonable cost. There are several good makes on the market, each possessing advantages of its own.

The general method of super-heating steam is to take the saturated steam from a boiler drum and pass it through coils surrounded by heated gas. The coils may be placed within the boiler setting so as to intercept the gases from the boiler furnace in their passage through the boiler, or they may be placed in a setting independent of the boiler and supplied with heat by drawing a portion of the gases from the boiler furnace, passing it through the super-heater and returning it to the boiler or economizer.

The coils are made of seamless drawn steel tubing or of cast iron of a suitable composition to stand high temperatures, important advantages being claimed for each. Whatever the method of construction adopted, the material used must be of the very best and the joints and connections made in the most approved manner, and with the greatest care. With such precautions as are now considered good practice, the super-heater may be depended upon as safely as the boiler, or engine, or any other part of the plant.

The import of Russian oil in China and Japan has decreased, while that of American has doubled.

TO CASE HARDEN SET SCREWS.

T. R. Hohness asks for a solution for case hardening set screws. A simple method is to take a mixture of equal parts of pulverized prussiate of potash, salt petre and salammoniac. Heat screws to dull red, roll in this powder, and then plunge in bath of 4 ounces of salammoniac and 2 ounces of prussiate of potash dissolved in gallon of water.

A DRAWER FOR TRACINGS

The idea of holding down the ends of drawings and tracings is not new, and the scheme shown in the cut is also old but a good one, says the Draftsman.

The thin strip b is put in at the rear of

Drawer for Holding Tracings.

the drawer to prevent the paper from curling and tearing.

Instead of the board flap or lid commonly seen in drawers, a raft like flap of three strips connected with heavy cord serves a double purpose, a "hold down" and save flap when thrown out of the way, the board often breaking off.

PRODUCES ZINC BY ELECTRICITY.

Zinc is being produced from zinc ore by means of electricity in Sweden as the result of experiments that have long been carried on by Dr. De La Vall. It is reported that the manufacture of carbide at Onan has been discontinued, and the production of zinc by Dr. De La Vall's method adopted. An expert states that Dr. De La Vall has for several years worked on the problem of producing zinc by electricity from lead-sulphur-zinc ores. He was probably led to this by different experiments in trying to separate iron from ores by electricity. An examining board has reported favorably on the method, and the result has been the organization of a company to exploit the invention and the ore deposits at Saxberget near Ludvika.

NEW TIRE FOR AUTOMOBILES.

An English manufacturer has brought out a new tire for automobiles designed

New Style Auto Tires.

to prevent slipping. The cut shows how this is accomplished.

RECIPE FOR CLEANING BRASS ARTICLES.

The following is a good recipe for cleaning brass articles: Six large spoonfuls of vinegar and two spoonfuls of salt. Apply with a small cloth, rubbing well. All stains will disappear and the brass will be as bright as when new. Wash the vinegar off and dry the brass, as it will become discolored if left on.

Want ads in Popular Mechanics receive answers from all over the United States and Canada.

DIRECTIONS FOR SILVERING MIRRORS.

In a late issue of the British Journal of Photography, Mr. P. Everitt recommends the following method of silvering glass on the front surface for optical purposes.

Take 2 drams of silver nitrate stock solution (of strength 25 grains to the ounce of distilled water) and convert it to ammonio-nitrate, by adding ammonia drop by drop until the precipitate formed is re-dissolved. Add 3½ oz. of distilled water.

In another measure take 80 drops (approximately 74 minims) of 40 per cent formalin.

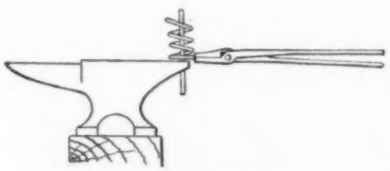
Pour the solution of ammonio-nitrate of silver into the measure containing the formalin, then back into the original measure, and finally into the dish containing the glass to be silvered. This should be done rapidly, and the dish containing the mirror well rocked until the silvering is complete, which may be ascertained by the precipitation of a black, flocculent deposit and the clearing of the solution. The actual process of silvering takes about two minutes.

Those who may wish to use the process should ascertain for each fresh sample of formalin the requisite quantity, as follows: Take 1 oz. of ammonio-nitrate solution and begin to reduce the silver with, say, 20 drops of formalin. If a muddy precipitate be formed, and the process be too slow, add more formalin. If too much formalin be used, the process will be too rapid, but, if the quantity be right, the solution will pass rapidly through shades of rose and violet until the black precipitate is formed and the solution begins to clear. Meanwhile a film of silver will be deposited upon the glass and the sides of the dish. The glass must be perfectly clean.

After the mirror has been silvered, hold it under the tap and allow water to flow over it for about three minutes. Rinse it with distilled water, and stand it up on edge on blotting paper. When it is quite dry take a pad of very soft wash-leather, spread a small quantity of finest optician's rouge on a sheet of clean glass, and well coat the pad with rouge by polishing the sheet of glass. A minute quantity of rouge is sufficient. Afterwards polish the mirror by gently rubbing the surface with the pad, using a circular stroke. For silvering a 6½-in. circular mirror I used about 20 ounces of solution, in a small, well-glazed earthenware pan.

TO STRAIGHTEN A COIL SPRING.

To straighten out a coil spring, says the American Blacksmith, heat it to a red



To Straighten Coil Spring.

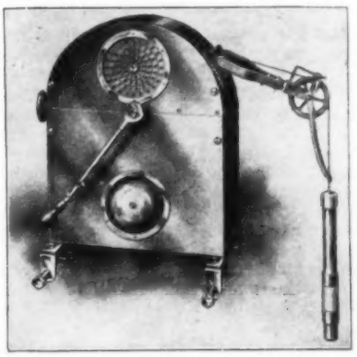
heat, place it on a rod or bolt in the hardy of the anvil, and pull it out straight by one hand.

GIVES A STIFF FINISH TO COTTON.

A German patent protects a process for giving a stiff finish to cotton goods to make them resemble linen. It consists in treating the cotton with bleaching powder, to superficial disintegration of the fibre and then mercerising. The goods are boiled with a strong soap solution after the action of the bleaching powder and then mercerised loose and rinsed and scoured under tension. A steaming process between the bleaching and the hot soap bath still further improves the effect

ELECTRIC SOUNDING MACHINE.

An electric sounding machine that will take soundings when the vessel is going at full speed and register 20 fathoms in less than half a minute has been invented by a Chicagoan—C. W. Farr, president of the C. W. Farr Telephone and Construction Supply Co., 120 West Jackson Boulevard, Chicago. The device may be



Electric Sounding Machine.

clamped to the rail of a vessel. Here is what Mr. Farr says about it:

"The lead sinker goes overboard; when it strikes bottom the electric circuit is closed; the bell rings in the machine; the hand on the dial points the exact depth in fathoms. The reel can be operated with a crank or an electric motor. It is 20 inches high; 16 inches wide and weighs 100 pounds. Allowance is automatically made for whatever speed the vessel may be traveling."

JUST THE THING FOR ELECTRICIANS.

One of the most serviceable and convenient reference books that has ever yet made its appearance is Laird & Lee's Vest Pocket Practical Compend of Electricity. The electrician will find it one of the best as a book of ready reference. The work is compiled by Prof. James A. Beaton, A. M., and has 116 illustrations.

BROWNLOW BILL FOR NATIONAL AID TO GOOD ROADS.

Good roads are getting to be the subject of more attention each year. The establishment of rural free delivery, whose carriers already travel more than 300,000 miles each day, and the expansion of this service which will in two years have in service 40,000 carriers supplying 40,000,000 people with mail, require good roads. The Brownlow bill, introduced in congress by W. P. Brownlow of Tennessee provides that the government is to pay one-half of the cost of the road, if the county or state pay the other half, the government to hold back 20 per cent of its share until the work is completed. The road, of course, would have to be built according to the specifications of a good road as adopted by the department.

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WASTED GENIUS OF LAUTMANN.

There are no sadder stories than those of whole lives wasted on inventions that have failed. Lautmann, a Russian, published a work on the advantage of using a musket with a rifled barrel. This genius had exactly hit upon the true idea of the modern rifle and had his invention been adopted the whole course of the world's history might, and probably would, have been altered, but the times were not ready for such an innovation. No one would take up Lautmann's rifle and it was not until many years after his death that the invention proved to the world what a genuis it had lost.

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POWERFUL ICE BREAKING STEAMERS—PART II.

The Baikal of Lake Baikal Carries Passengers and Cuts Through Ice 36 Feet Thick

EDITOR'S NOTE: In the last issue Mr. Greener told of the powerful ice-breaking ship Nadorshnie, that kept the harbor of Vladivostock, Siberia, open all winter. In Lake Baikal, also in Siberia, Mr. Greener has discovered an ice-breaking ship that is still more powerful. It is called the Baikal. The Nadorshnie could not cut ice that was thicker than 14 feet. The Baikal cuts through ice that is 36 feet thick.

The ice breaker Baikal, used on Lake Baikal, is built of Siemens & Martin steel. The length is 290 feet; breadth, 57 feet; draft forward, 18 feet; draft aft, 20 feet; speed, 12 knots; displacement, loaded, 4,200 tons. There are three triple-expansion engines of 1,250 horsepower; two engines abaft, separated by a fore and aft water-tight bulkhead and one engine placed forward to turn the propeller and assist the ice breaker in cutting the ice. The propellers are all four-bladed. Fifteen cylinder-type boilers are placed in two compartments divided by a bulkhead. Water-ballast tanks form the double bottom. There are, besides, fore and aft ballast tanks; capacity of all tanks, 580 tons. The fore and aft ballast tanks are to put the steamer into position for crushing the ice. A steel belt runs around the water line. It is composed of sheets 1 inch in thickness, riveted from the inside. To obviate the damage from ice striking the sides at the water line, there are wooden wedges, on top of which logs are placed. This wooden belt is 2 feet thick. The Baikal resembles Nansen's Fram, except in the construction of bow and stern, which are so built that the Baikal can move forward or backward with equal facility while breaking the ice. Twenty-five loaded passenger cars can be placed on the main deck, where there are three pairs of rails. One hundred and fifty passengers can be accommodated in the cabin. The Baikal can cut ice 36 feet thick. It is supposed to be the second largest ice breaker in the world, the Ermak being first.

The difficulty in the winter transit of Lake Baikal lies in the fact that the entire surface is frozen solid. The broken ice can not be removed, and there is of course no tide to carry it away. The Baikal makes trips from December to April, and she has been known to be a week making the 46 miles across.

HIGHER CULTURE ON THE FARM.

Our Mary Jane has been to school (she calls
it "Female College")
To get the hang of languages and other kinds
of knowledge;
We scraped and saved to put her where we
thought it best would pay,
Her mother making butter, her daddy raking
hay;
We sent her for a four-year term, we wanted
her to get
Eddicational advantages—she has 'em, you can
bet.
She's learned a heap of other things (it's them
that makes the fuss);
She ain't content to know herself, but wants
to teach to us.

Since Mary Jane's been home from school,
you'd scarcely know the place:
The old-time parlor fixings has got their "koop
dee grace";
The sampler that my mother worked, the hair
wreaths sister made,
The new rag carpet Mandy sewed (she'd barely
got it laid),
The hair cloth sofa, chairs to match—they all
had got to go,
For Mary Jane decided they were scarcely
"comm eel fow";
The new porshaires of shells and beads (they
took a year to make),
But they're banished to the garret, for
"higher culture's" sake.

Since Mary Jane's been home from schoo.,
'twould puzzle any man
To name the things we get to eat, and as for
me, I swan
I never go to table without offering up a
prayer
That when I get to heaven, they'll feed me
farmer's fare.
For the "ragoos," and the "entries," the
"horse dee overs," too,
Ain't near as satisfying as a pork and turnip
stew;
And the "trifles" and the "suffles," the jellies,
and the cake,
Don't fill a feller like the pies that Mandy
used to make.

And then again our manners, they mayn't be
"up to snuff,"
But still for me an' Mandy they was always
good enough;
But Mary Jane, "Lord bless us!" finds fault
from morn till night,
There ain't a thing we do or say we do or
say it right.
It's true we brought it on ourselves, and yet
it's awful sad,
I'm clear worn out with listening, and Mandy's
just as bad.
Some day, if we drop off the perch, just write
it on our grave,
"They died from 'higher cultshure' and
a-learning to behave." —N. Y. Sun.

ELECTRIC PUMPS IN SOUTH AFRICA.

Electric motor driving for pumps in South Africa have superseded steam for the reason that a much more even turning movement is obtained over "dead centers", and for this reason steam cannot be used expansively and, therefore, economically over the greater part of the stroke—hence their christening, "steam eaters."

The South African Export Gazette says: "Centrifugal pumps are largely used for moderate speed motors and are coupled direct in all cases; where high lifts are not encountered they are frequently adopted. The condensation necessarily arising over long lengths of piping is also a source of trouble, and an adverse factor towards economy. One of the chief charms possessed by motor pump driving for auxiliary pumps lies, as previously mentioned, in their adaptation to automatic control under rising heads of water, and in being capable of being stowed away in any corner, where they are available to deal with coming danger without anything more than daily inspection. A simple instrument in the engine room indicates the behavior of the pump, and automatic alarm is given should it fail to respond quickly enough for emergency working.

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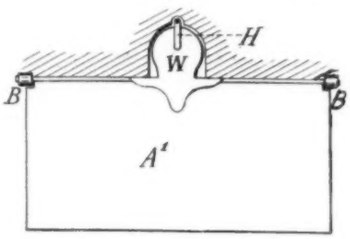
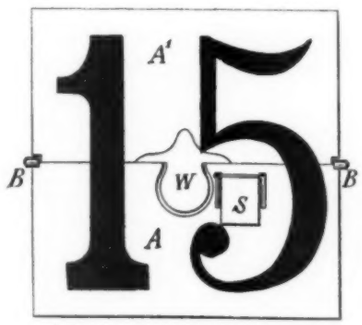
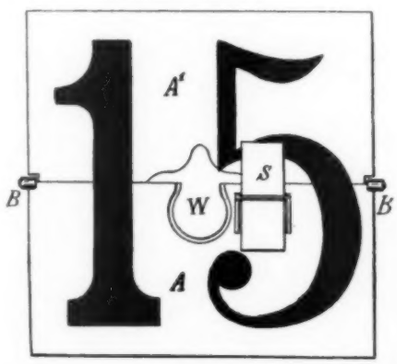




A'-SHIELD B-PIVOT W-WEIGHT
S-AUXILIARY SIGNAL.



On two sides of the room are immense boards like black boards, each 28 feet high and 28 feet wide, and placed 20 feet above the floor. Each board is divided into 1,200 squares—one for each member—and each square contains his number in figures which can be plainly seen in all parts of the room. When member No. 15 is wanted a shutter drops in the 15 square revealing the figures and the man knows he is needed somewhere. But where? At some one of the telephone booths, at the telegraph, his own office, or at the door. The instant he looks at the number in his square he knows just where to go, for there are seven colored discs attached to the figures, and each color tells a different message, and a glance tells him just where to go. When he has received his signal he can touch a button and the figures in his square are once more concealed. Eight thousand wires are necessary in the working of the apparatus, which is operated by an ingenious system of push buttons located at several points about the room. The Electrical Age says there is more wire in this system than any other of the electrical branches or systems in the building, such as the telephone service or the electric lighting, 1,300,000 feet of rubber covered copper wire being required.

Figure 1, shows the signal closed; Fig. 2, with the shield down displaying the number; Fig. 3, displaying both number and the auxiliary call which indicates where the member is wanted.

KITTY KNEW.

"Seven sheep were standing
By the pasture wall.
Tell me," said the teacher,
To her scholars small,
"One poor sheep was frightened,
Jumped and ran away.
One from seven—how many
Woolly sheep would stay?"
Up went Kitty's fingers—
A farmer's daughter she,
Not so bright at figures
As she ought to be.
"Please, ma'am"—"Well, then Kitty
Tell us if you know."
"Please, if one jumped over,
All the rest would go."

The steam turbine has recently startled the engineering world with its sudden and spectacular advent into the field, says the Engineer, yet the gas engine central station is slowly but surely assuming material form.

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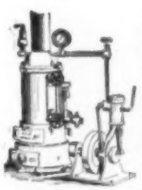

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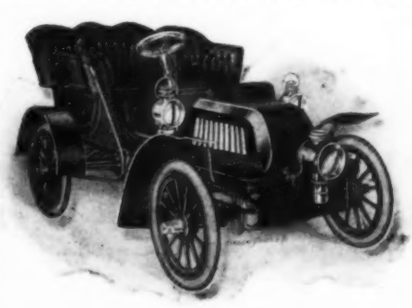

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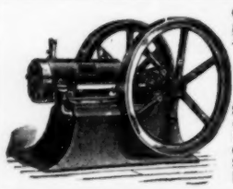

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Wrought up with a determination to win the America's cup next August regardless of all costs or pains, Sir Thomas Lipton and Europe's most famous yacht builders are now putting forth the efforts of their lives in building the new challenger, the Shamrock III. Never before in the history of the world has such exertion and money been spent on a single amusement craft. Never in the history of sporting has a sportsman so recklessly flung his money to the winds in his determination to win a contest.

Sir Lipton smiled and appeared not greatly displeased when twice he failed to win the America's cup, but behind that smile was an irritating disappointment and a forming resolution to yet win the laurels to which he aspired or lose his fortunes in the attempt. It was never intended that any other Englishman should challenge for the cup, although Sir Thomas would make it appear that way.

Thus a great boat is being built at Fairlie on the Clyde. "Build a boat that will win!" is the unconditional command of Sir Thomas, and his fortune of millions is back of the command. Defeat again, he says, means disgrace and ridicule that he will not tolerate. Those who know of the Englishman's efforts say his next boat is bound to win; defeat, they say, would be impossible after such colossal expenditure of money and efforts. Designer Watson and William Fife, the famous European yacht builders, are in charge of the building of the Shamrock III. They are being assisted by the unstinted time and labors of the Dennys of Dumbarton, the builders of Shamrock II.

WHAT IS LUCKY AND UNLUCKY.

Despite Our Intelligence We Yet Harbor Many Superstitions.

In spite of this enlightened age and the fact that superstitions are considered to be born of ignorance there are yet many saws about luck in which men and women still believe. It is said to be unlucky to—

Make a present of a knife to a friend without receiving in return a money equivalent for each blade.

Walk or drive between the carriages of a funeral.

Walk under a ladder.

Crawl through an open window.

Raise an umbrella in a house.

Have a chick or a kitten or any animal die in your hand.

Put a black band around a friend's hat in jest.

Wear opals.

Cross the threshhold of a door with the left foot first.

Permit a child to see its own face in a mirror until it is at least 1 year old.

Sleep in a room with the number 13 on the door.

Sit at a table with thirteen persons.

Return for something you have forgotten without sitting down first.

Undertake a journey on Friday.

Sing before breakfast, for you will cry before night.

Say the final words of a play at a rehearsal before the first public performance.

On the other hand, most people who are at all superstitious, and some who are not, solemnly avow that it is peculiarly fortunate for you to—

Wear rubies; they ward off rheumatism.

Wear sapphires; they protect you against the wiles of a deceitful lover.

Wear turquoises; they will keep you from falling out of a high window.

Wear amethysts; they will enable you to drink a hogshead of wine without ill effect.

Marry on Wednesday.

Be married on a sunshiny day, for "happy is the bride that the sun shines on."

Plight your troth with a wishbone or a horseshoe hidden in your pocket.

Carry a rabbit's foot or a talisman in your pocket.

Probably any of the first are equal in efficacy to any of the latter. At least, so says the cynic.

The most inflammable and dangerous coal dusts are those which are raised to a red heat by the application of the least quantity of heat, which depends on the amount of bituminous or volatile matter contained in the coal, as this must all be driven off by the heat before the dust becomes red hot.

A project is on foot to construct a canal from Yeddington, near London, to the English channel.

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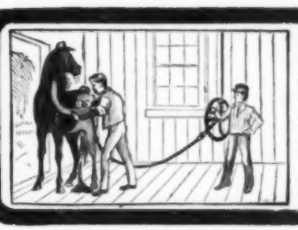

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FAREWELL TO THE ALLIGATOR.

America's Largest Reptile is Nearly Extinct.

Those who want to lay in a stock of alligator skins had better do so now, for in a few years there will be no alligators in America. When the French settled Louisiana they found the alligator, the largest of American reptiles, in almost every stream, lying about like logs in the water and crawling along the banks of rivers, bayous and creeks. While the advance of civilization kept down the number of the reptiles in Louisiana there were countless thousands of them up to 20 years ago. But some one in Louisiana 30 years ago tanned an alligator skin and made a pair of shoes from it. It took some years after for the seamed and knotty leather to grow in favor. But when it did become popular the slaughter of the alligator began which is destined to wipe it out of existence. The extinction of an animal, so abundant as the alligator was in Louisiana, in so short a time is almost without a parallel. Moreover the alligator is naturally long lived, its normal age being estimated at from 100 to 150 years. The animal skins have long been in demand for many years for almost all kinds of leather goods, grips, valises, purses, hand-bags, etc. When the skins became very scarce as a result of the wholesale slaughter, dealers resorted to all kinds of imitations, until now it is almost impossible to get an article made of pure alligator skin.

Carried on as it must be at night, for the animal sleeps nearly all day in the mud, the hunt for the alligator is very picturesque. As a matter of fact it is as safe as playing billiards, and no one was ever hurt in it save for a ducking in the bayou from the overturned pirogue. The reptiles are attracted by a torch or other bright light and are easily killed in spite of their rough skins.

GOOD BYE.

Jus' can't sing a single note
'Cause a lump comes in th' throat,
An' th' tongue is parched an' dry
When a feller says goodby.

Scores of all th' happy years
Kind o' glimmer through th' tears,
An' th' smile ends in a sigh
When a feller says goodby.

Darn a feller 'at don't mind
Leavin' true-blue frien's behind.
Not a bit ashamed t' cry—
Goodby!
—W. M. Maupin.

FACE WASHED FIRST TIME IN 15 YEARS

Big Ben, the great London clock, whose deep tones tell the residents in the neighborhood of Westminster Abbey and the houses of parliament the time of day and night, has just had his face washed for the first time in fifteen years. The last washing was not such a difficult task as the first, which was when hanging cradles had not been perfected. Then, in order to reach the face a scaffold 190 feet from the ground, had to be built. With the hanging cradles it took but a week to wash the face, which is an expanse of 400 square feet of opal glass, to say nothing of the surrounding gilded iron work. New electric lights will now gleam from behind the four dials to carry the correct Greenwich time to an unknown distance. These lights consists of six powerful Nerst lamps, each of 60-candle power, so that when the six are burning they will give a light of 360 candles. The Big Ben tower, which holds aloft Great Britain's greatest clock, derives its name from the hour bell, which weighs 27,100 pounds. The hammer for the bell weighs 400 pounds. The pendulum is more than 13 feet long and weighs 700 pounds. The dials of the clock are 22 feet in diameter. The hour fingers are 2 feet long and the minute spaces are 1 foot square. The minute hands are 11 feet long.

INCREASING SPEED OF SHIPS.

There are enormous difficulties and expense involved in a still further increase of speed of steamships beyond that already attained. The high speed destroyer is probably the lightest structure possible and is almost entirely filled with machinery for its propulsion, containing 6,000 horsepower though little more than 200 feet long. To attain twice their present speed such boats would require eight times as much power—that is nearly 50,000 horsepower or far more than is possessed by the largest and fastest vessel afloat. Hence there is no hope of obtaining upon the sea, speeds of locomotion already reached on the land, with any form of motive power known at present.

Cable makers, high speed engine builders, suppliers of the various raw materials which go toward building up electrical machinery, have had little cause to complain at the business of the last year.

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.....POINTS AND FACTS..

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